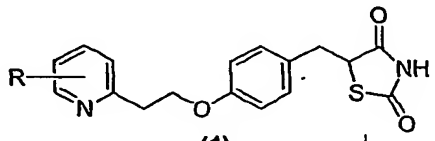
We claim:

1. A process for the preparation of thiazolidinediones of formula 1 wherein R represents straight chain or branched alkyl group of one to six carbon atoms, such as methyl, ethyl, propyl, *iso*-propyl, butyl, *iso*-butyl, *sec*-butyl, *tert*-butyl, pentyl, *iso*-pentyl, neo-pentyl, hexyl, preferably the lower alkyl groups of one to three carbon atoms, more preferably R represents 5-ethyl, when the compound of formula 1 represents pioglitazone, which involves



(1)

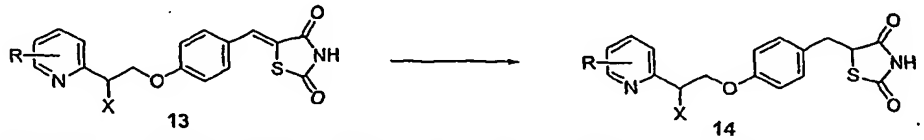
reducing the compound of formula 14 or its salts, where X represents OH, Cl, Br, OMs, and OTs to the compound of formula 1.

14 1

2. A process as claimed in claim 1 wherein the reduction is carried out using zinc and acetic acid in alcoholic solvents selected from methanol, ethanol, isopropanol, water or their mixtures thereof or catalytic hydrogenation with Raney Nickel, 10% Pd/C in solvents such as MeOH, EtOH, isopropanol, THF.

3. A process for the preparation of compound of formula 1 as claimed in claim 1, where X represents OH, Cl, Br, OMs, and OTs, comprising

i) chemoselective reduction of the compound of formula 13, where X is as defined earlier, to obtain 14

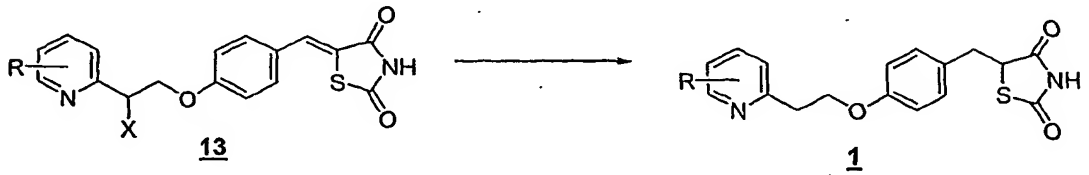


13 14

ii) Reduction of compound of formula 14 as claimed in claim 1 to obtain the compound of formula 1.

4. A process as claimed in claim 3 wherein the reduction of compound of formula **13** to obtain compound of formula **14** is carried out by reacting **13** with metal borohydrides selected from sodium borohydride, lithium borohydride, potassium borohydride, tetraalkyl borohydride, zinc borohydride, in presence of suitable cobalt catalyst selected from cobaltous chloride, cobaltous acetate and cobaltic chloride in suitable solvent selected from methanol, ethanol, iso-propanol, acetone, DMF and THF either alone or in combination thereof, optionally in the presence of suitable ligands selected from 2,2'-bipyridyl, 1,10-phenanthroline and dimethyl glyoxime at 50 to 100 °C or by using Raney nickel, palladium charcoal, palladium black, palladium sulfate, palladium carbonate, barium sulfate, barium carbonate, platinium oxide or platinum on carbon in solvents selected from methanol, ethanol, propanol, dioxane, dimethoxyethane, tetrahydrofuran, ethyl acetate, acetic acid, dimethyl formamide, N-methyl pyrrolidine, either alone or in combinations thereof at 50 to 100 °C

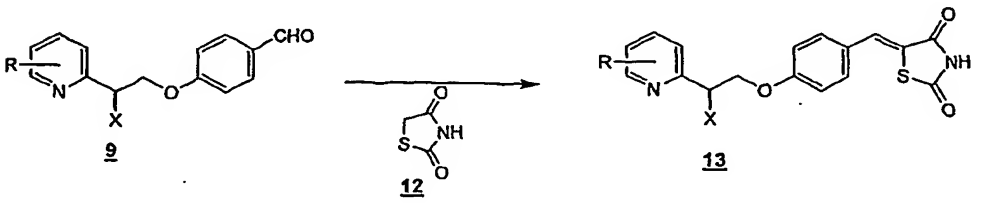
5. A process of preparation of compound of formula **1** by catalytic reduction of the compound of formula **13**, where X represents OH, Cl, Br, OMs, and OTs, & R represents straight chain or branched alkyl group of one to six carbon atoms, such as methyl, ethyl, propyl, *iso*-propyl, butyl, *iso*-butyl, *sec*-butyl, *tert*-butyl, pentyl, *iso*-pentyl, neo-pentyl, hexyl, preferably the lower alkyl groups of one to three carbon atoms, more preferably R represents 5-ethyl, using Raney Ni or 10% Pd-C in alcoholic solvents to obtain the compound of formula **1** directly.



6. A process for the preparation of compound of formula **1** as claimed in claim 1 which involves

   i) condensation of a compound of formula **9**, with 2,4-thiazolidinedione of formula **12**, in suitable solvents selected from methanol, ethanol, propanol, 2-propanol, butanol, *iso*-butanol, 2-methoxyethanol, dimethyl formamide, dimethyl sulfoxide, sulfolane, acetonitrile, dioxalane, dimethoxyethane, toluene, acetic acid or their mixtures thereof, in presence of an organic base

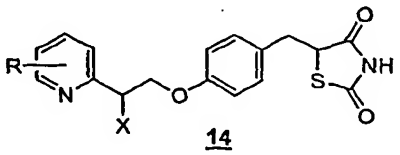
selected from ammonia, methyl amine, ethyl amine, *n*-butyl amine, pyrrolidine, piperidine, pyridine, morpholine, piperazine, diethylamine, di-isopropyl amine or triethyl amine and catalytic amount of organic acid selected from acetic acid, *p*-tolune sulfonic acid, hydrochloric acid, or hydrobromic acid to obtain compound of formula **13**.



ii) chemoselective reduction of the compound of formula **13**, as claimed in any preceding claims above to obtain **14**.

iii) Reduction of compound of formula **14** as claimed in claim 1 to obtain the compound of formula **1**.

7. A compound of formula **14**, or its salts, where X represents Cl, Br, OMs, and OTs and R represents straight chain or branched alkyl group of one to six carbon atoms, such as methyl, ethyl, propyl, *iso*-propyl, butyl, *iso*-butyl, *sec*-butyl, *tert*-butyl, pentyl, *iso*-pentyl, neo-pentyl, hexyl, preferably lower alkyl groups of one to three carbon atoms.



8. A compound as claimed in claim 6 wherein R represents 5-ethyl;

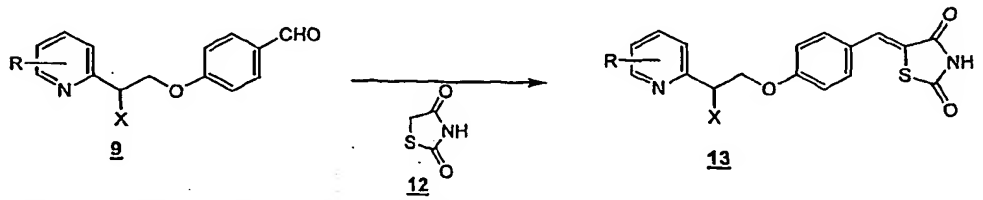
9. A process for the preparation of compounds of formula **14**, where X represents OH, Cl, Br, OMs, and OTs & R represents straight chain or branched alkyl group of one to

six carbon atoms, such as methyl, ethyl, propyl, *iso*-propyl, butyl, *iso*-butyl, *sec*-butyl, *tert*-butyl, pentyl, *iso*-pentyl, neo-pentyl, hexyl, preferably the lower alkyl groups of one to three carbon atoms, more preferably R represents 5-ethyl, comprising chemoselective reduction of the compound of formula **13**;

13 14

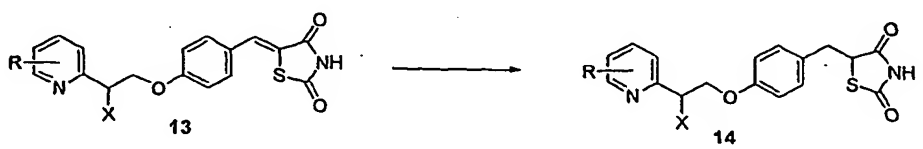
10. A process of preparation of compound of formula **14** as claimed in claim 9 which involves

i) condensation of a compound of formula **9**, with 2,4-thiazolidinedione of formula **12**, in suitable solvents selected from methanol, ethanol, propanol, 2-propanol, butanol, *iso*-butanol, 2-methoxyethanol, dimethyl formamide, dimethyl sulfoxide, sulfolane, acetonitrile, dioxalane, dimethoxyethane, toluene, acetic acid or their mixtures thereof, in presence of an organic base selected from ammonia, methyl amine, ethyl amine, *n*-butyl amine, pyrrolidine, piperidine, pyridine, morpholine, piperazine, diethylamine, di-isopropyl amine or triethyl amine and catalytic amount of organic acid selected from acetic acid, *p*-tolune sulfonic acid, hydrochloric acid, or hydrobromic acid to obtain compound of formula **13**.



9 12 13

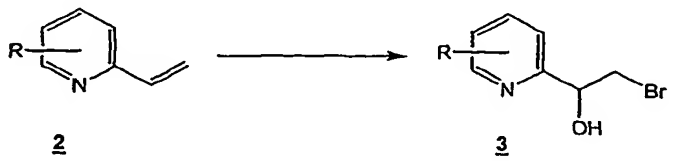
iii) chemoselective reduction of the compound of formula **13** to obtain **14**.



13 14

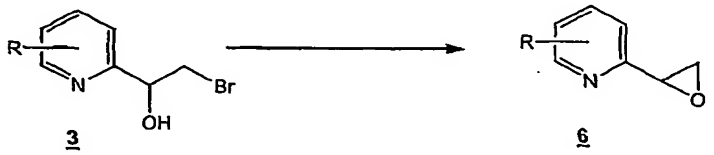
11. A process for preparing compound of formula **14** which involves

a) converting a compound of formula 2 to a compound of formula 3 where R is as defined earlier using N-bromosuccinimide in suitable solvents selected from dimethyl sulfoxide, acetone, tetrahydrofuran, *tert*-butanol, dimethoxyethane or their mixtures thereof in the presence of atleast one equivalent of water.



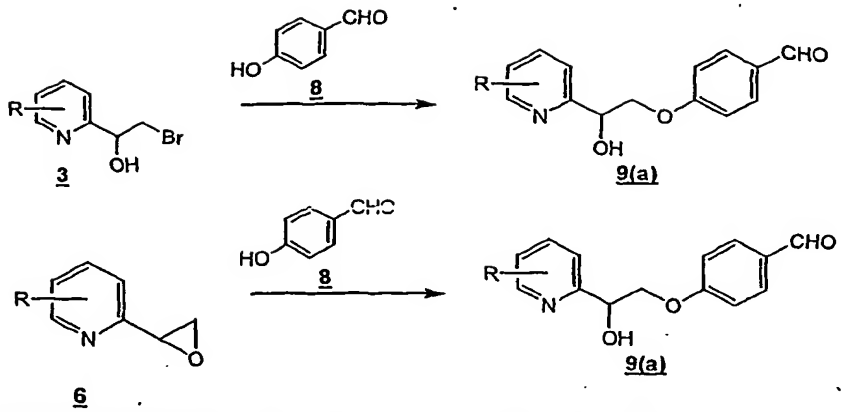
2 3

b) converting the bromohydrin of formula 3 to the epoxide of 6 using bases selected from Na_2CO_3, K_2CO_3, $NaHCO_3$ in above mentioned solvents

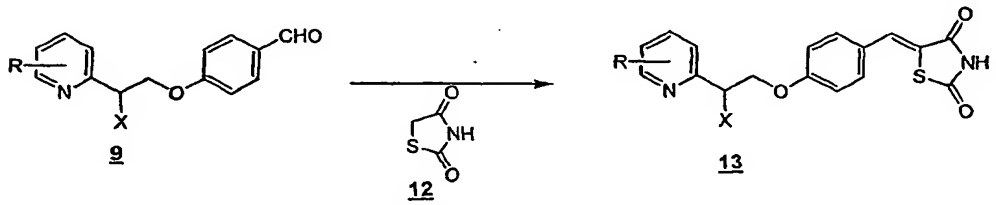


3 6

c) reacting the bromohydrin of formula 3 or the epoxide of formula 6 with *p*-hydroxy benzaldehyde with suitable inorganic base selected from sodium carbonate, potassium carbonate, cesium carbonate, sodium hydroxide, potassium hydroxide, sodium hydride in suitable solvents selected from dimethyl sulfoxide, dimethyl formamide, tetrahydrofuran, dimethoxyethane, acetonitrile, toluene, tert-butanol, methanol, isopropanol or their mixtures thereof, in a ratio 3 to 50 volume with respect to the starting material at temperature 50-100 °C.



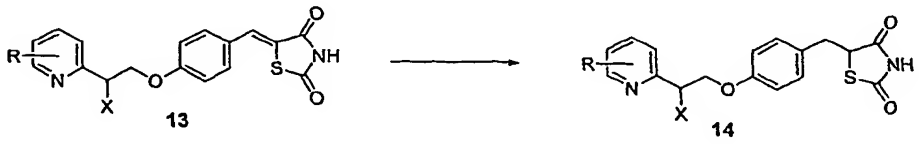
optionally, converting the compound of formula **9(a)** to its mesylate, tosylate, chloro or bromo derivative (compound of formula **9**, where X



represents OH, Cl, Br, OMs, OTs).

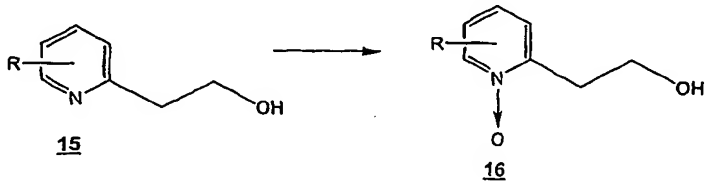
e) condensation of a compound of formula **9** or **9(a)**, with 2,4-thiazolidinedione of formula **12**, to obtain compound of formula **13**

f) chemoselective reduction of the compound of formula **13** to obtain **14**.

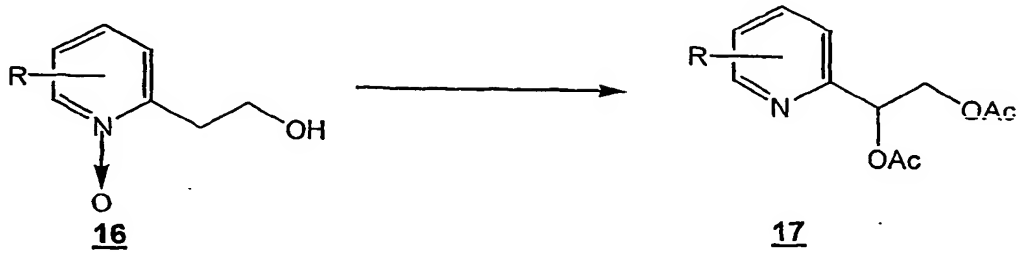


12. A process for the preparation of compound of formula **14**, where X represents OH, Cl, Br, OMs, and OTs & R is as defined earlier, which involves the following sequence of steps:

i) converting a compound of formula **15** to a compound of formula **16** using 30% H_2O_2 in acetic acid at 0-20 °C.

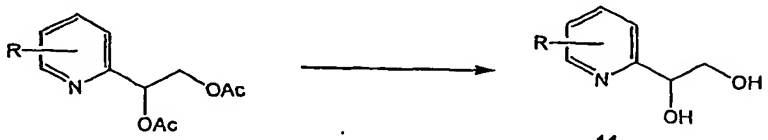


ii) converting the compound of formula 16 to compounds of formula 17 using acetic anhydride under reflux;



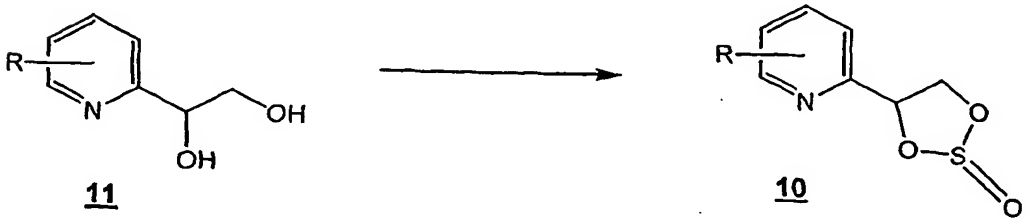
16 17

iii) converting the compound of formula 17 to compound of formula 11 by hydrolysis with NaOH, KOH in water or alcoholic solvents



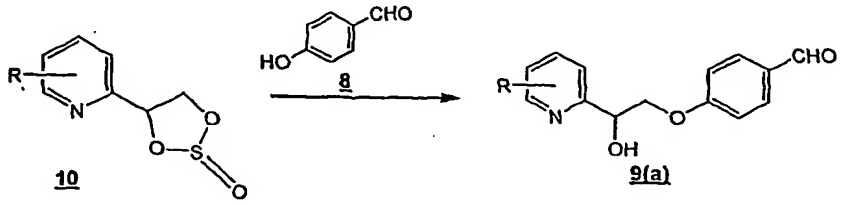
17 11

iv) converting the compound of formula 11 to compound of formula 10 by reacting with thionyl chloride in the presence of organic bases selected from ammonia, methyl amine, ethyl amine, *n*-butyl amine, pyrrolidine, piperidine, pyridine, morpholine, piperazine, diethylamine, di-isopropyl amine, triethyl amine or their mixtures thereof



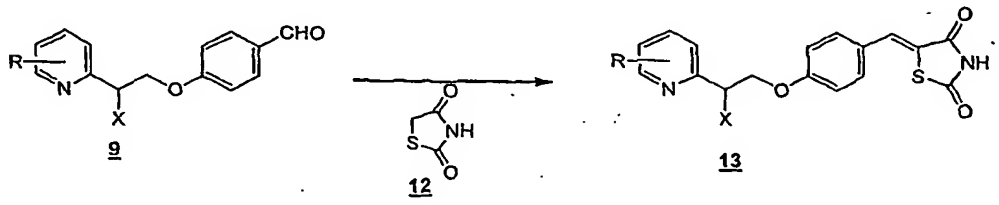
11 10

v) converting the compound of formula 10 to compound of formula 9(a) by reacting with *p*-hydroxy benzaldehyde in the presence of suitable inorganic base selected from sodium carbonate, potassium carbonate, cesium carbonate, sodium hydroxide, potassium hydroxide, sodium hydride in suitable solvents selected from dimethyl sulfoxide, dimethyl formamide, tetrahydrofuran, dimethoxyethane, acetonitrile, toluene, *tert*-butanol or their mixtures thereof, at temperature 50-100 °C



vi) optionally, converting the compound of formula 9(a) to its mesylate, tosylate, chloro or bromo derivatives (compound of formula 9, where X represents OH, Cl, Br, OMs, OTs).

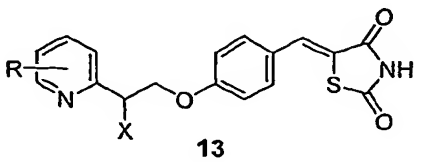
vii) condensation of a compound of formula 9, with 2,4-thiazolidinedione of formula 12, to obtain compound of formula 13.



viii) chemoselective reduction of the compound of formula 13 to obtain 14

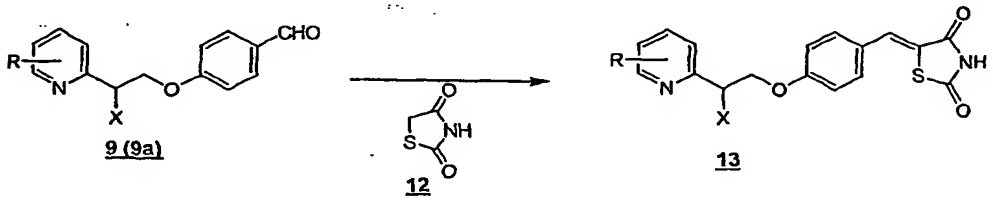
13. A compound of formula 13, or its salts, where X represents OH, Cl, Br, OMs, and OTs and R represents straight chain or branched alkyl group of one to six carbon atoms, such as methyl, ethyl, propyl, *iso*-propyl, butyl, *iso*-butyl, *sec*-butyl, *tert*-butyl, pentyl,

iso-pentyl, neo-pentyl, hexyl preferably the lower alkyl groups of one to three carbon atoms, more preferably R represents 5-ethyl;



13

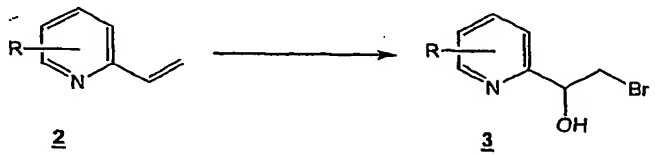
14. A process for the preparation of compounds of formula **13**, or its salts, where X represents OH, Cl, Br, OMs, and OTs & R is as defined earlier, comprising condensation of a compound of formula **9** or **9(a)**, with 2,4-thiazolidinedione of formula **12**, to obtain compound of formula **13**.



9 (9a) 12 13

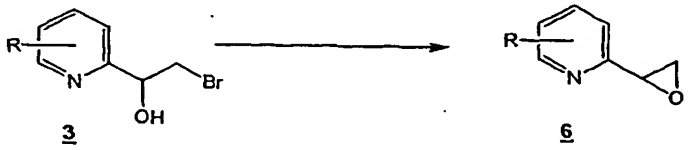
15. A process for the preparation of compound of formula **13** which involves

i) a) converting a compound of formula **2** to a compound of formula **3**



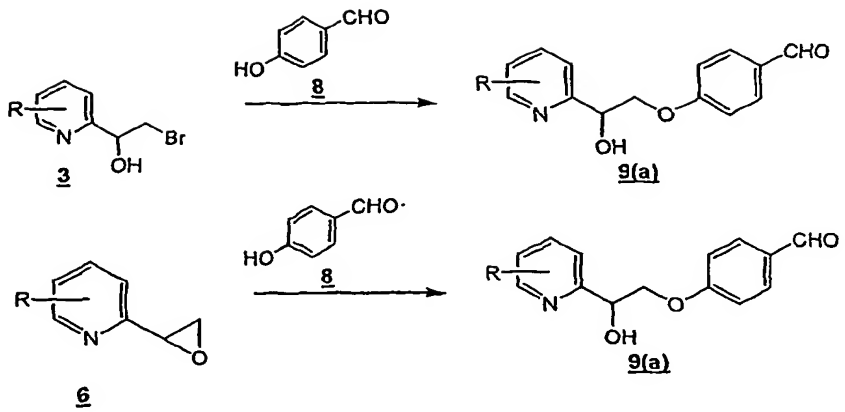
2 3

b) converting the bromohydrin of formula **3** to the epoxide of **6**,



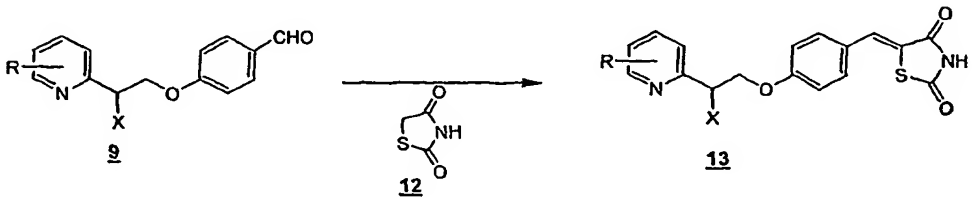
3 6

c) reacting the bromohydrin of formula **3** or the epoxide of formula **6**,

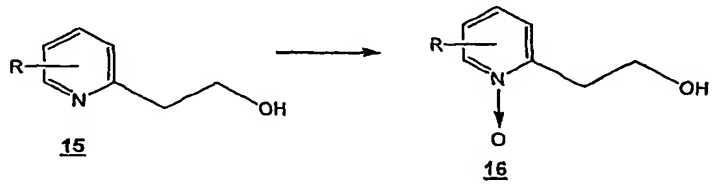


d) optionally, converting the compound of formula 9(a) to its mesylate, tosylate chloro or bromo derivatives (compound of formula 9, where X represents OH, Cl, Br, OMs, OTs).

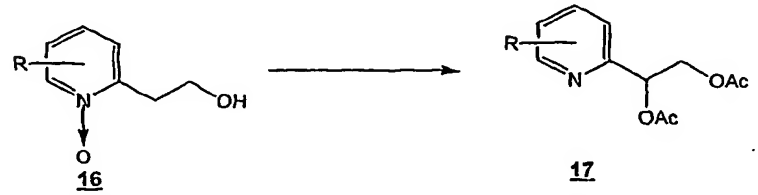
e) condensation of a compound of formula 9, with 2,4-thiazolidinedione of formula 12, to obtain compound of formula 13.



ii) a) converting a compound of formula 15 to a compound of formula 16



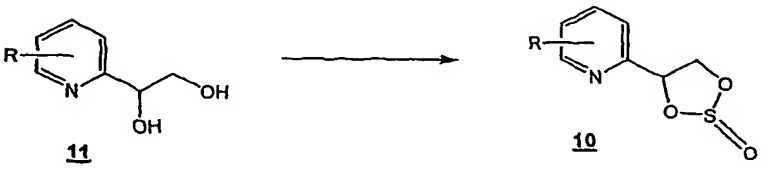
b) converting the compound of formula 16 to compounds of formula 17



c) converting the compound of formula 17 to compound of formula 11

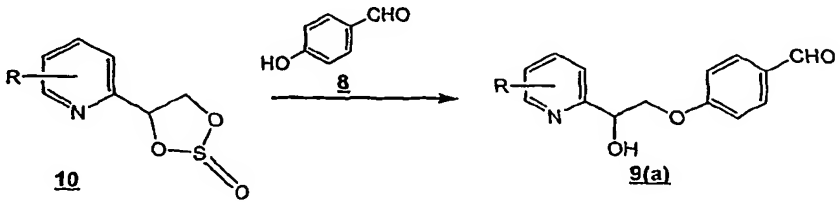
17 11

d) converting the compound of formula 11 to compound of formula 10



11 10

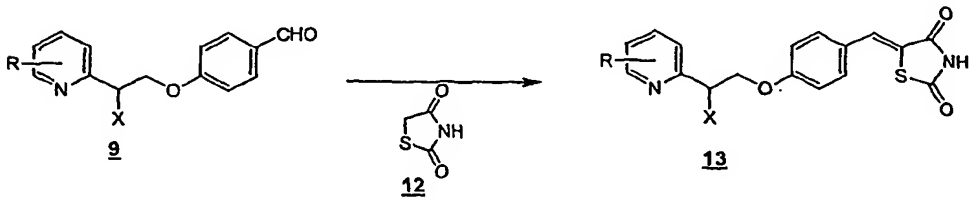
e) converting the compound of formula 10 to compound of formula 9(a)



10 8 9(a)

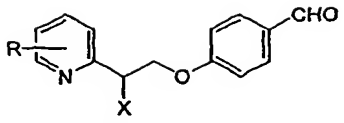
f) optionally, converting the compound of formula 9(a) to its mesylate, tosylate, chloro or bromo derivatives (compound of formula 9, where X represents OH, Br, Cl, OMs, OTs).

g) condensation of a compound of formula 9, with 2,4-thiazolidinedione of formula 12, to obtain compound of formula 13.



9 12 13

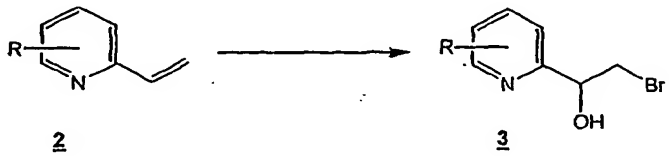
16. A compound of formula 9, or it salts, where X represents OH, Cl, Br, OMs, and OTs and R represents straight chain or branched alkyl group of one to six carbon atoms, such as methyl, ethyl, propyl, *iso*-propyl, butyl, *iso*-butyl, *sec*-butyl, *tert*-butyl, pentyl, *iso*-pentyl, neo-pentyl, hexyl and the like, preferably the lower alkyl groups of one to three carbon atoms, more preferably, R represents 5-ethyl;



9

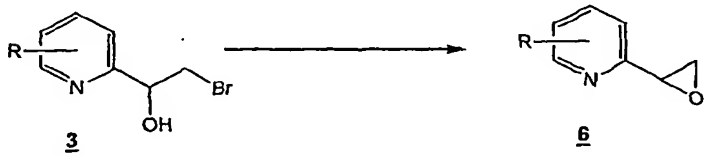
17. A process for the preparation of compound of formula 9, where X represents OH, Cl, Br, OMs, and OTs & R is as defined earlier, which involves the following steps

i) a) converting a compound of formula 2 to a compound of formula 3



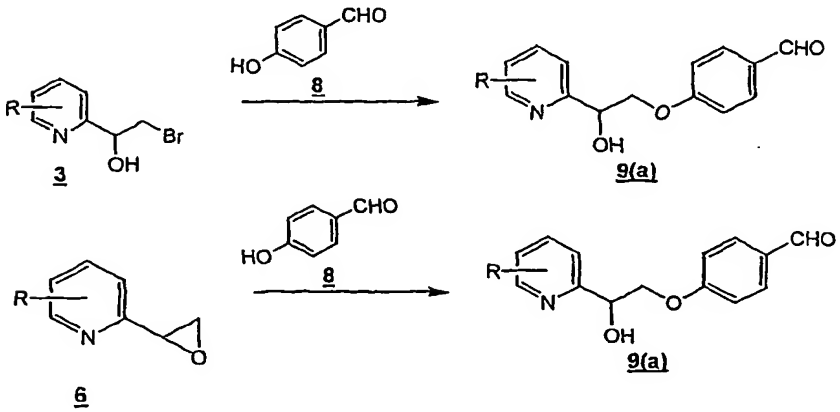
2 3

b) converting the bromohydrin of formula 3 to the epoxide of 6.



3 6

c) reacting the bromohydrin of formula 3 or the epoxide of formula 6 with *p*-hydroxy benzaldehyde

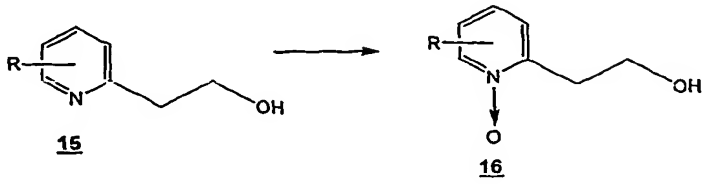


3 8 9(a)

6 8 9(a)

c) optionally, converting the compound of formula 9(a) to its mesylate, tosylate, chloro or bromo derivatives (compound of formula 9, where X represents OH, Cl, Br, OMs, OTs).

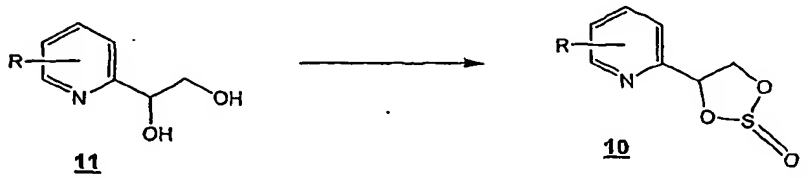
ii) a) converting a compound of formula **15** to a compound of formula **16** using 30% H_2O_2 in acetic acid



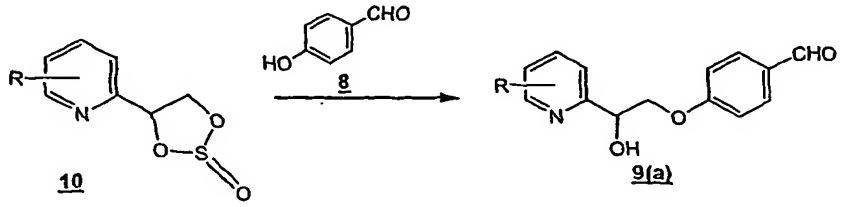
b) converting the compound of formula **16** to compounds of formula **17**

c) converting the compound of formula **17** to compound of formula **11**

d) converting the compound of formula **11** to compound of formula **10**



iii) e) converting the compound of formula **10** to compound of formula **9(a)**



d) optionally, converting the compound of formula 9(a) to its mesylate, tosylate, chloro or bromo derivative (compound of formula 9, where X represents OH, Br, Cl, Br, OMs, OTs).

18. A process for converting the thiazolidinedione of formula 1, prepared according to the present process, to its pharmaceutically acceptable salt, preferably its HCl salt, by reacting with suitable acid preferably HCl, in a suitable solvent, preferably methanol, ethanol, isopropanol.

19. A pharmaceutical composition containing Pioglitazone prepared according to the present invention

20. A pharmaceutical composition containing compound of formula 13 or 14 or their pharmaceutically acceptable salts or their mixtures thereof.

21. A method of treatment comprising administering to a person in need thereof, a compound of formula 13 or its pharmaceutically acceptable salts or 14 or its pharmaceutically acceptable salts or a pharmaceutical composition containing 13 or 14 or their pharmaceutically acceptable salts.

22. A method as claimed in claim 13, wherein the disease is selected from diabetes, hyperlipidemia or obesity or a disease caused by insulin resistance as a pathophysiological mechanism.